8. Vector Plots

The ability to plot vectors is available in longitude-latitude and latitude-vertical plots. It cannot be done in time-latitude plots.

Unlike some other netCDF plotting programs, Panoply does not automatically recognize that the presence of particular variables in a dataset means that a vector plot can be created from those variables. Instead, you must combine those variables manually.

The first step is to create a combination plot (see Sects. 3.3 and 4.3) using the two variables which represent the vector components and selecting "Vector Magnitude" as the type of combination. For example, wind speed and ocean current data commonly use u and v as names for the eastward and northward vector components. Figure 8.1 shows a GISS ModelE dataset which includes such variables.
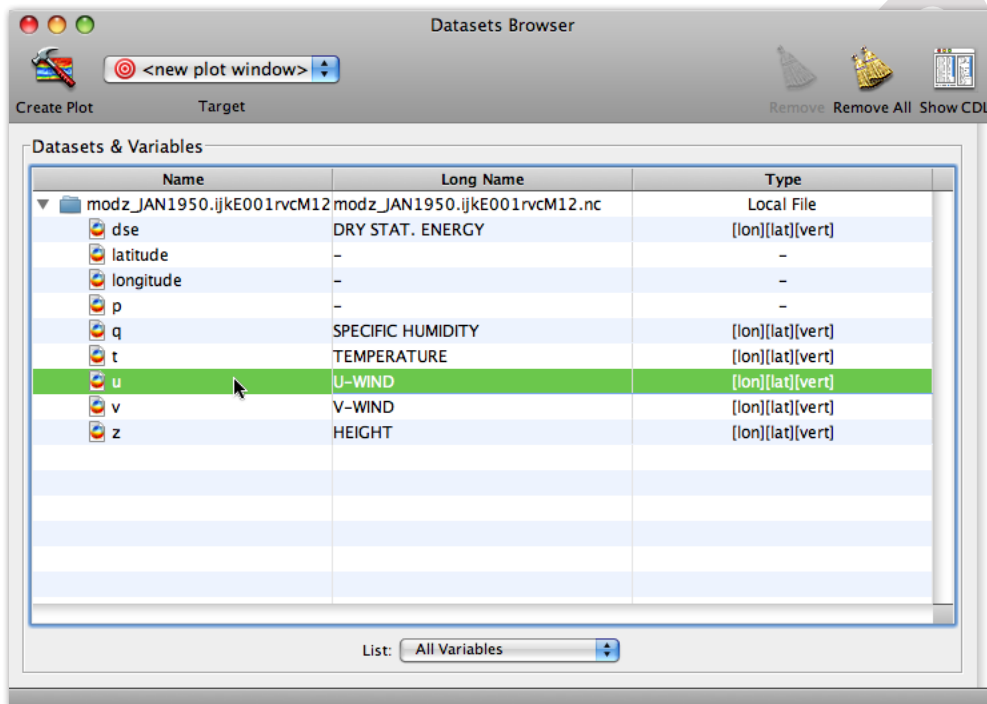
In this case, you would begin by creating a plot of the *u* variable and then adding the *v* variable to that plot.

Once both variables are being used in the plot, go to the Arrays tab of the plot controls and choose the "Vector Magnitude" item in the combination pop-up menu, as shown in Fig 8.2.
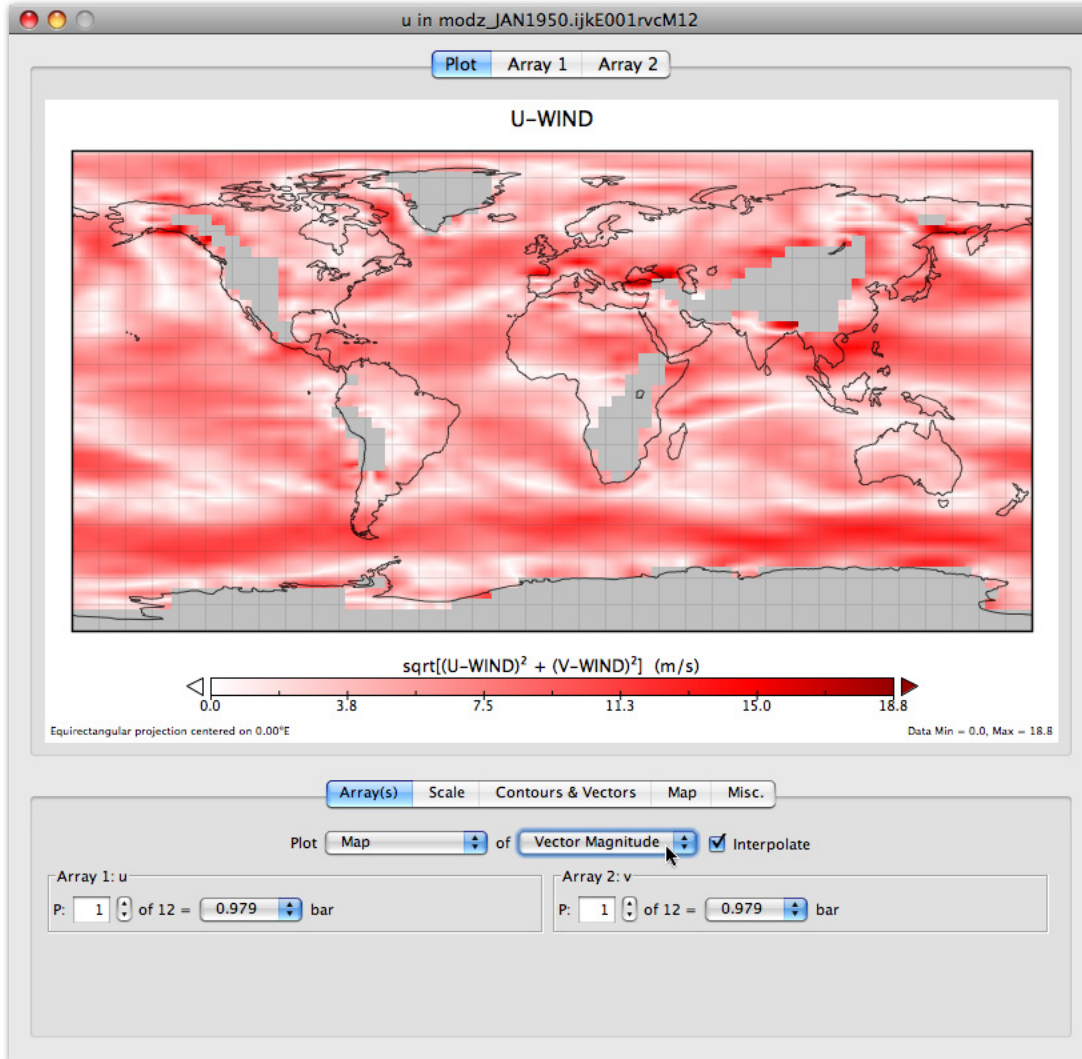
This data displayed in the plot should now display the magnitude of the combined variables. For wind speed components, this means $(u^2 + v^2)^{-1/2}$.

In Fig. 8.2, no vectors are yet visible. Whether or not they are shown at this point depends on the vector settings you have specified in the Preferences window.

Alter the plot scale settings in the Scale tab of the plot controls. You will probably want to set the scale minimum to 0.0 and the maximum to some rounded off value roughly equal to the actual data maximum. For a colorbar, you will likely find that a single-color gradient ("redscale PAL" or "bluescale PAL", for example) works best. You will want to set the color table so that more color means faster winds or currents.

Now go to the Contours and Vectors tab of the plot controls and set the contour controls, shown in Fig 8.3, as required.
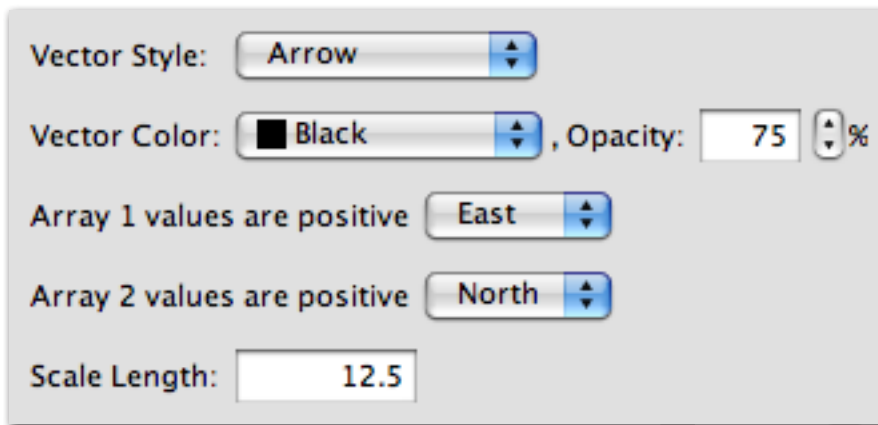
Figure 8.3

If vectors are not already visible, use the Vector Style pop-up menu select the type of vector to draw, either a regular arrow or an "upstream dot". In the latter case, there is no arrowhead at the tip of a vector, but instead, as the name suggests, a dot at its base. You can also specify the color and opacity of the vectors.

Be sure that the variables used to define the vector components are set to the correct directions. In the case of wind speed, this means indicating that the u variable (which in Fig. 8.2 is Array 1) is east-positive and the v variable (Array 2) is north positive.

Finally, you need to indicate how long the "standard" vector should be drawn. As shown in Fig 8.4, this vector is drawn to the right of the scale colorbar and is about 20 pixels long (this varies a bit depending on the size of the plot you are making). You should enter in the "scale length" text field the data value which matches this vector length.
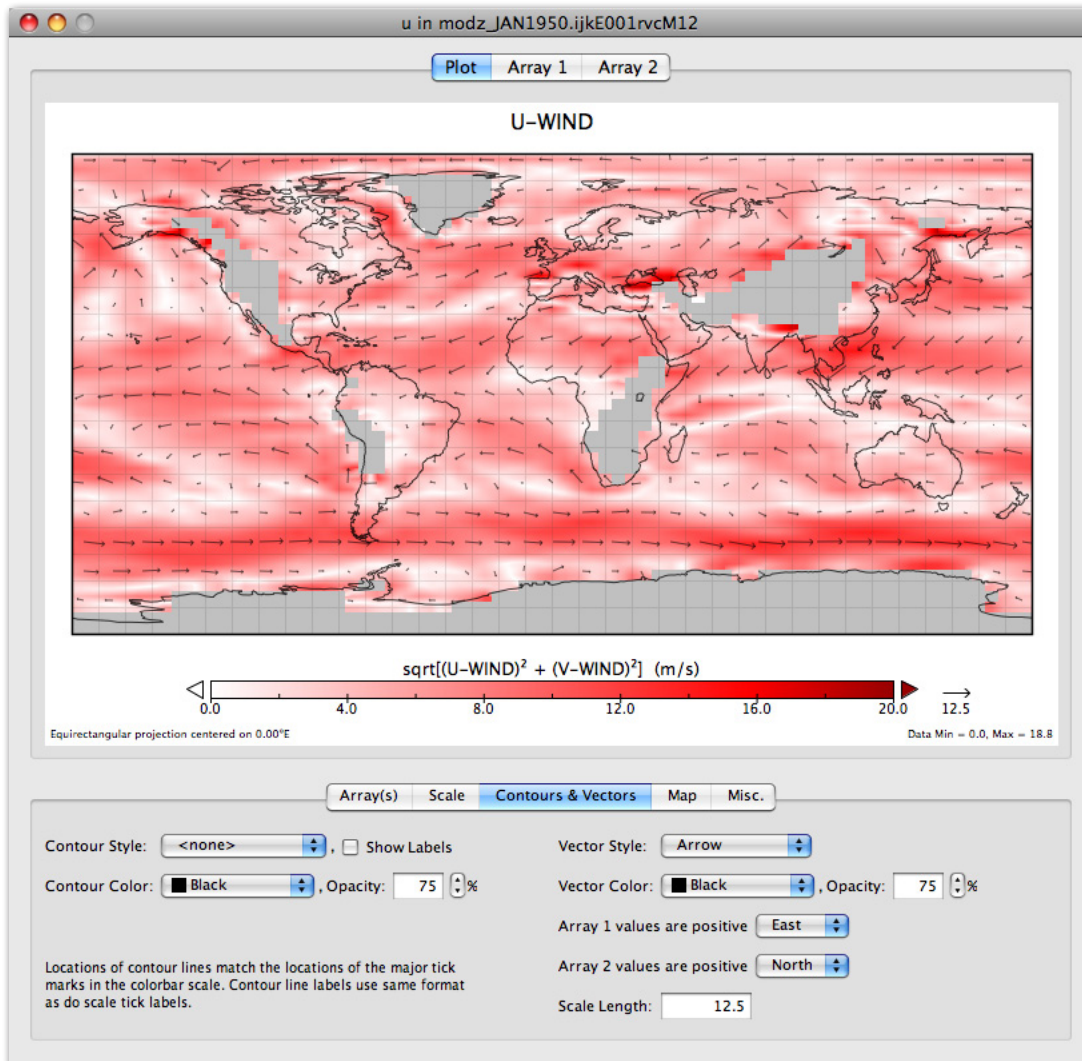
For example, a map of surface wind speeds would likely have values equal to the data maximum at only a few isolated locations. Entering this maximum value in the scale length field would result in a plot with a lot of space between very small vectors. Consequently, you probably want to specify some lesser value. In Fig 8.4, the maximum data value is 18.8, but the average value is between 10 and 15 m/s. In this example case, a scale length of 12.5 seems to work well.